

Arizona Department of Transportation

**MARICOPA COUNTY TRANSPORTATION EXCISE TAX
Forecasting Process & Results
FY 2004-2006**



Financial Management Services

November 2003

**MARICOPA COUNTY TRANSPORTATION EXCISE TAX
OFFICIAL FORECAST UPDATE
RISK ANALYSIS OF EXPECTED VALUES
as of November 2003**

Introduction

This document contains the Arizona Department of Transportation's (the Department) forecast of expected values for the Maricopa County Transportation Excise Tax for the period FY 2004-2006.

Background

Since 1986, the Department has used a comprehensive regression-based econometric model to estimate Transportation Excise Tax revenues for Maricopa County. These revenues, which flow into the Regional Area Road Fund (RARF), are the major funding source for the Maricopa County Freeway Program.

The revenue forecast is highly dependent on estimates of independent variables. In order to deal with variability between estimated and actual values, the Department introduced the Risk Analysis Process (RAP) in 1992. The RAP relies on probability analysis and the independent evaluation of the model's variables by an expert panel of economists. The process results in a series of forecasts, with specified probabilities of occurrence, rather than a single or "best guess" estimate.

Enhanced forecasting accuracy was achieved in July 1996, when Hickling Lewis Brod Inc. (HLB) working in conjunction with Dr. Dennis Hoffman of Arizona State University, incorporated economic data and independent variables which were not included in the 1986 model.

In September 2000 and 2003, HLB reviewed the model and updated the equations. The independent variables contained in the updated model include:

- Maricopa County real income growth per capita
- Maricopa County population growth
- Maricopa County construction employment growth
- Phoenix Consumer Price Index (CPI)
- Prime interest rate.

Risk Analysis Panel

The Risk Analysis Process relies heavily on the judgments of an expert panel of economists to provide information critical to the forecasting process. In September 2003, an expert panel of nine economists, representing public, private, and academic sectors provided their individual estimates of the model's independent variables and comments on the future economic outlook.

The information gathered from the panelists was input into the updated model to produce a series of forecasts with associated probabilities of occurrence. The data are detailed in the tables at the back of this report.

Model Results

The model results from the panelists inputs produced a mean forecast of \$775.2 million for the period FY 2004-2006 with a compound growth rate of 7.5 percent.

The Department's Official Forecast for FY 2004-2006 totals \$773.0 million with a compound growth rate of 8.7 percent. The FY 2004 forecast of \$277.0 million was developed independently of the econometric model using time series techniques and historic and projected growth rates from the model. The FY 2004 forecast is 3.1 percent above the FY 2003 collections.

The FY 2004-2006 forecast utilizes the 50% confidence interval to account for less uncertainty in the future due to the expiration of the excise tax in two and a half years. The Mean Forecast and the Department's Official Forecast are detailed below.

FY 2004 Official Forecast (Dollars in Millions)

<u>Fiscal Year</u>	<u>Mean Forecast</u>	<u>Official Forecast</u>	<u>Confidence Level</u>
2004	\$281.9	\$277.0	N/A
2005	\$303.1	\$305.0	50%
2006	<u>\$190.2</u>	<u>\$191.0</u>	50%
Total	\$775.2	\$773.0	
Ave. CGR	7.5%	8.7%	

For comparison purposes, the November 2002 Official Forecast and the November 2003 Official Forecast are shown below:

FY 2004 Comparative Forecast
(Dollars in Millions)

<u>Fiscal</u> <u>Year</u>	<u>Nov. 02</u> <u>Official</u> <u>Forecast</u>	<u>Nov. 03</u> <u>Official</u> <u>Forecast</u>	<u>Difference</u>
2004	\$290.4	\$277.0	(\$13.4)
2005	\$307.5	\$305.0	(\$2.5)
2006	\$190.5	\$191.0	\$0.5
Total	\$788.4	\$773.0	(\$15.4)
Avg. CGR	6.0%	8.7%	

Summary

The Department's Official Forecast for FY 2004-06 totals \$773.0 million which reflects the remaining two and a half years of the Maricopa County Transportation Excise Tax. The November 2003 Official Forecast was reduced by \$15.4 million from the November 2002 Official Forecast. The decrease in the forecast is a result of the prolonged slow economic recovery in Maricopa County created by job losses in the manufacturing and tourism sectors. FY 2004 expects to see improved economic conditions with businesses slowly increasing spending and hiring new employees.

Supplementary Information

The remainder of this report presents supplementary information on the Department's model, the values of the independent variables forecast by the expert panel, and detailed results of the Risk Analysis Process.

RARF Official Revenue Forecast
With Category Detail and Confidence Interval by Fiscal Year
(Current Dollars in Millions)

Fiscal Year Percentile	2003 Actual	2004 N/A	2005 50%	2006 50%
Retail Sales	\$133.9	\$139.7	\$155.4	\$97.7
Contracting	38.9	37.3	44.1	27.3
Utilities	18.5	19.0	20.1	12.1
Restaurant / Bar	22.6	23.8	26.5	16.6
Rental - Real Property	25.7	27.3	27.9	18.1
Rental - Personal Prop.	12.8	13.1	13.4	8.6
Other	16.2	16.8	17.6	10.6
Total	\$268.7	\$277.0	\$305.0	\$191.0

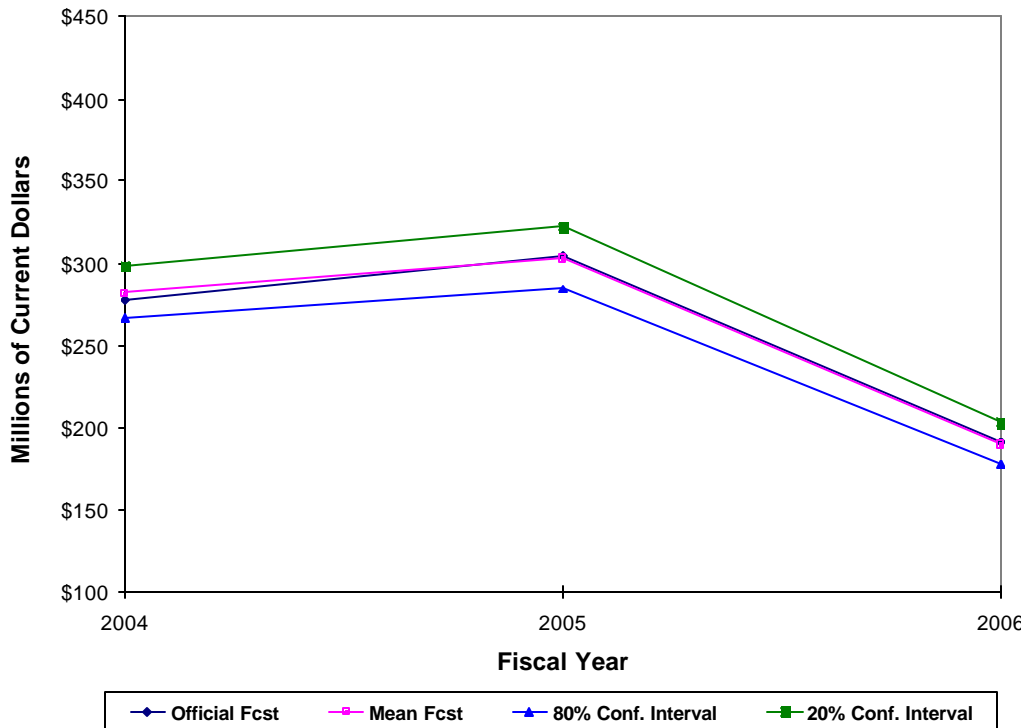
RARF TOTAL TAX REVENUE RISK ANALYSIS RESULTS
(Current Dollars in Millions)

Fiscal Year	Mean	10%	20%	30%	40%	50%	60%	70%	80%	90%
2004	\$281.9	\$304.6	\$298.7	\$292.8	\$288.2	\$284.4	\$279.2	\$273.6	\$267.2	\$254.7
2005	303.1	332.3	322.4	315.7	310.1	305.0	299.6	293.0	284.6	269.3
2006	190.2	209.7	203.5	198.8	193.9	191.0	187.6	183.8	177.5	167.6

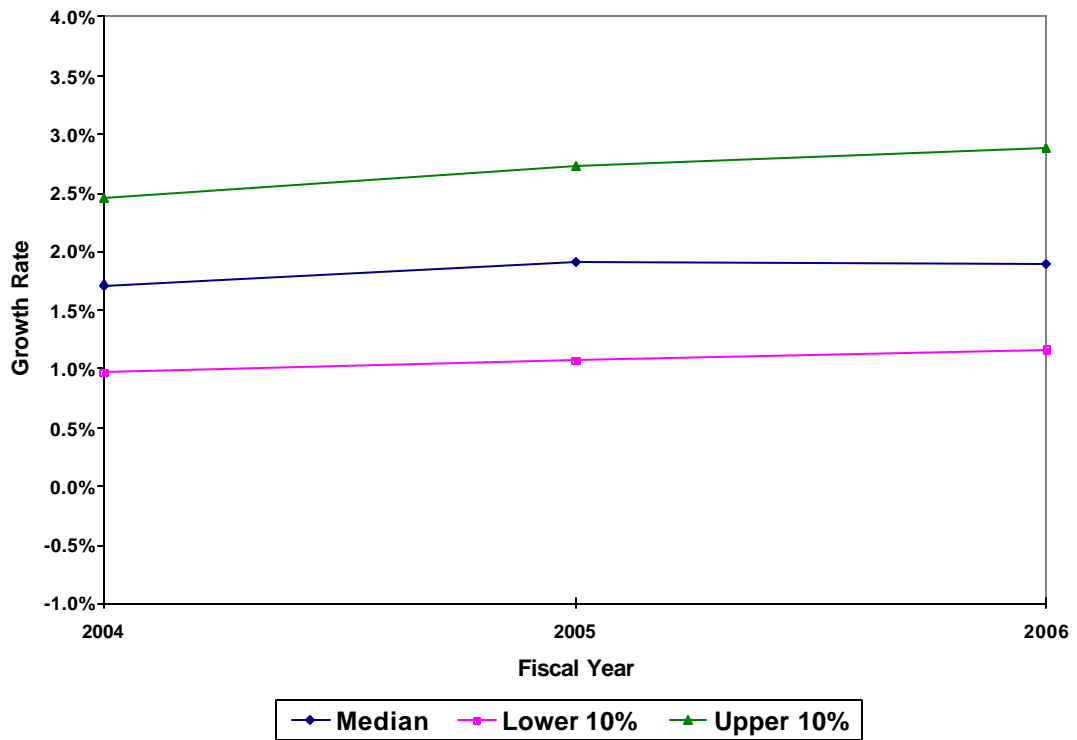
Official Forecast Results

(Current Dollars in Millions)

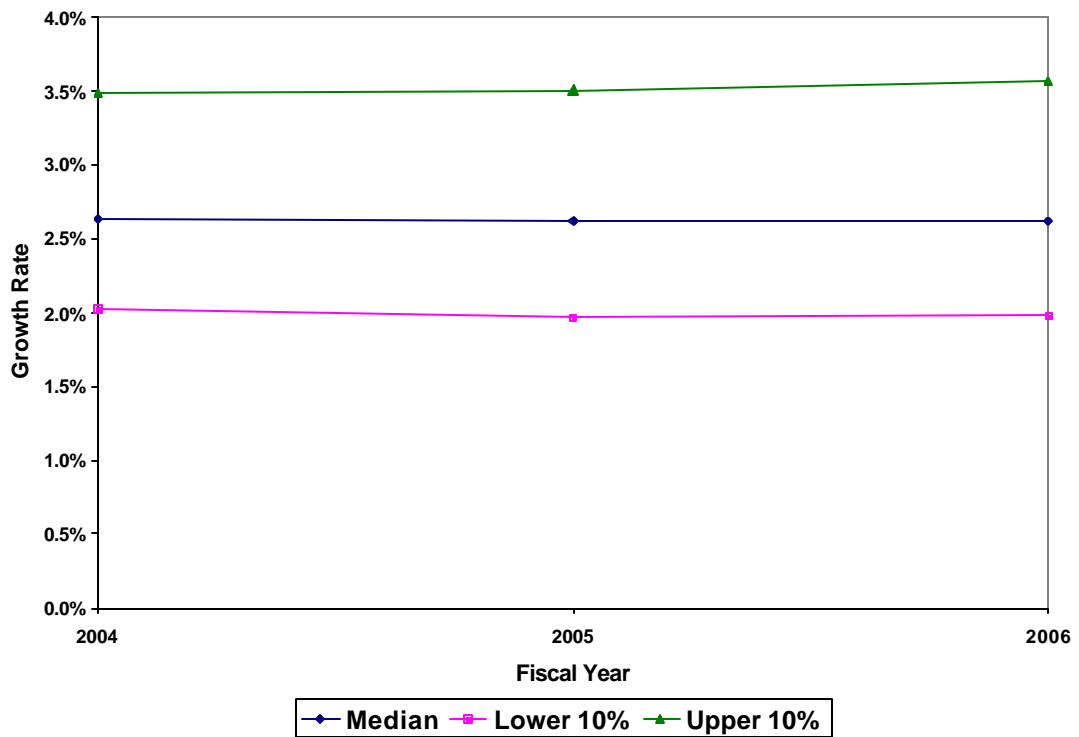
Fiscal Year	Official Forecast	Mean Forecast	80% Conf. Interval	20% Conf. Interval
2004	\$277.0	\$281.9	\$267.2	\$298.7
2005	305.0	303.1	284.6	322.4
2006	191.0	190.2	177.5	203.5
Total	\$773.0	\$775.2	\$729.3	\$824.5



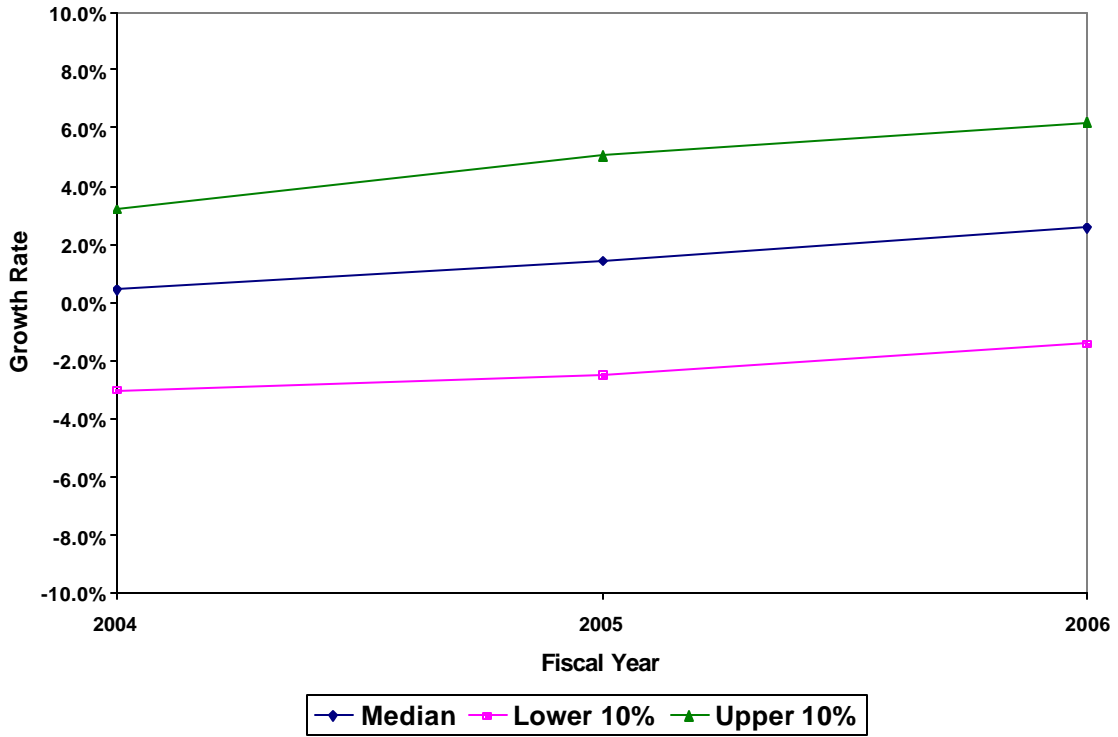
Maricopa County Real Income Per Capita



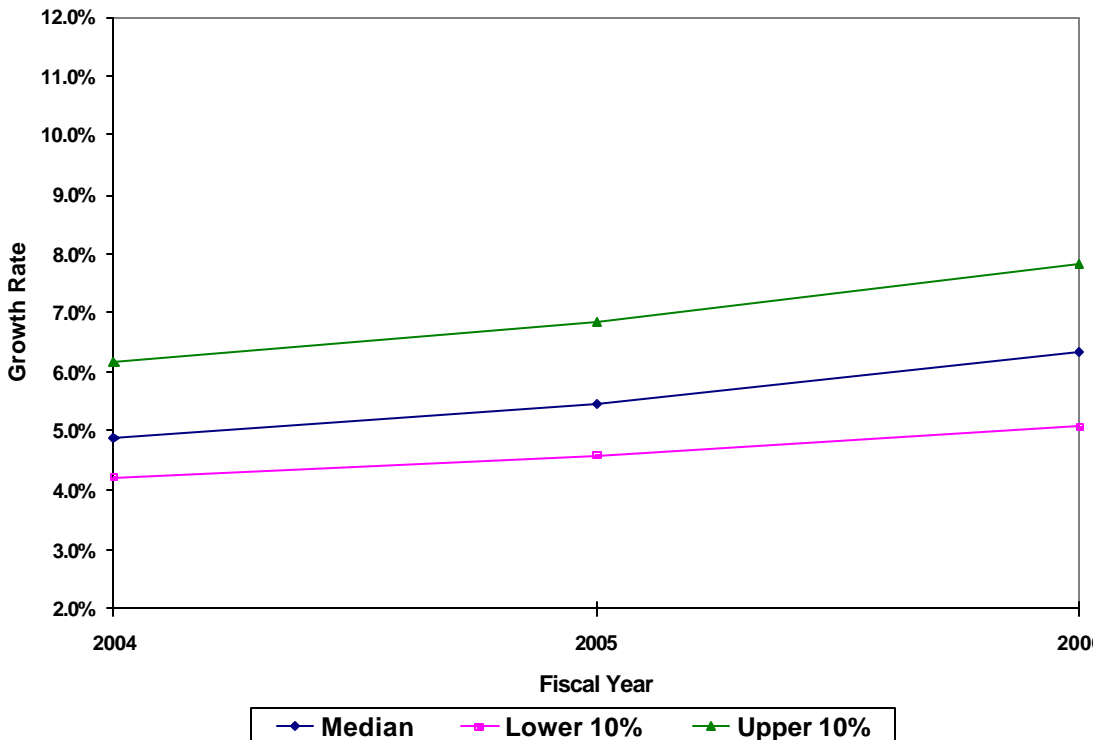
Maricopa County Population

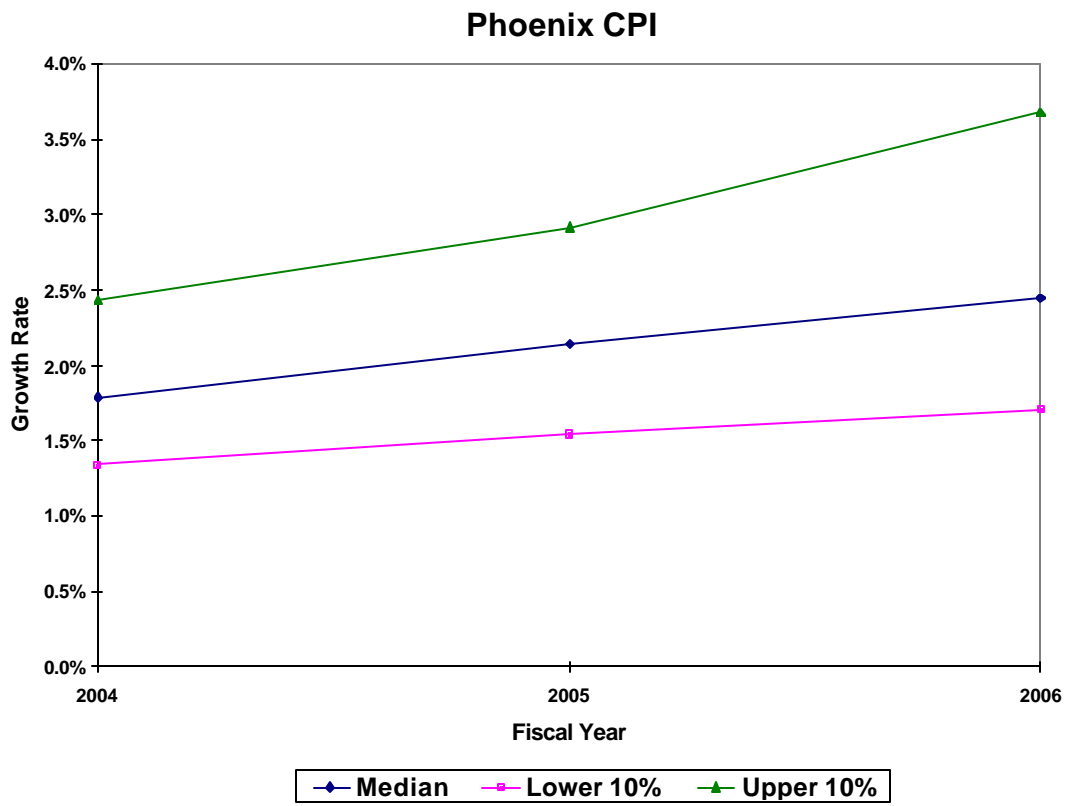


Maricopa County Construction Employment Growth Rate



Prime Interest Rate





Mean Panelist Data Values

	Income Growth	Population Growth	Construction Employment	Prime Rate	Phoenix CPI Growth
FY 2004					
Upper 10%	2.46	3.49	3.21	6.17	2.43
Lower 10%	0.96	2.02	-3.02	4.22	1.34
Median	1.71	2.64	0.44	4.86	1.79
FY 2005					
Upper 10%	2.72	3.51	5.04	6.86	2.92
Lower 10%	1.07	1.97	-2.47	4.59	1.55
Median	1.91	2.62	1.48	5.47	2.14
FY 2006					
Upper 10%	2.87	3.56	6.19	7.84	3.68
Lower 10%	1.16	1.98	-1.39	5.08	1.71
Median	1.90	2.62	2.56	6.36	2.44

All data in the above table are percentage growth rates with the exception of the Prime Rate column which are nominal percentage values.

Per Capita Income Growth Rate				
		2004	2005	2006
Panelist 1				
	Upper 10%	2.20	2.50	2.90
	Lower 10%	0.30	0.40	0.50
	Median	1.00	1.40	1.50
Panelist 2				
	Upper 10%	2.75	2.75	2.50
	Lower 10%	1.50	1.50	1.40
	Median	2.00	2.00	1.90
Panelist 3				
	Upper 10%	2.80	3.50	4.00
	Lower 10%	1.70	1.90	2.10
	Median	2.00	2.30	2.50
Panelist 4				
	Upper 10%	2.10	2.30	2.50
	Lower 10%	1.00	1.20	1.40
	Median	1.50	1.70	1.90
Panelist 5				
	Upper 10%	2.40	2.50	2.60
	Lower 10%	1.10	0.60	0.50
	Median	2.00	2.00	1.90
Panelist 6				
	Upper 10%	2.20	2.40	2.50
	Lower 10%	1.20	1.20	1.00
	Median	1.80	1.80	1.60
Panelist 7				
	Upper 10%	3.20	3.70	3.70
	Lower 10%	0.00	0.70	1.50
	Median	1.70	2.20	2.00
Panelist 8				
	Upper 10%	2.00	2.20	2.70
	Lower 10%	0.50	0.70	0.80
	Median	1.50	1.80	2.00
Panelist 9				
	Upper 10%	2.50	2.60	2.40
	Lower 10%	1.30	1.40	1.20
	Median	1.90	2.00	1.80

All data in the above table are percentage growth rates.

Maricopa County Population Growth Rate				
		2004	2005	2006
Panelist 1				
	Upper 10%	3.80	3.80	4.00
	Lower 10%	2.20	2.10	2.00
	Median	2.80	2.70	2.60
Panelist 2				
	Upper 10%	3.50	3.50	3.40
	Lower 10%	1.90	1.90	2.30
	Median	3.00	3.00	2.90
Panelist 3				
	Upper 10%	5.00	5.00	5.00
	Lower 10%	1.50	1.50	1.50
	Median	2.40	2.40	2.40
Panelist 4				
	Upper 10%	2.90	2.90	2.80
	Lower 10%	1.90	1.90	1.80
	Median	2.40	2.40	2.30
Panelist 5				
	Upper 10%	3.00	3.20	3.30
	Lower 10%	2.00	1.90	1.90
	Median	2.60	2.60	2.60
Panelist 6				
	Upper 10%	3.50	3.50	3.50
	Lower 10%	2.20	2.20	2.00
	Median	2.70	2.70	2.70
Panelist 7				
	Upper 10%	3.70	3.70	3.90
	Lower 10%	2.40	2.40	2.70
	Median	2.90	2.90	3.10
Panelist 8				
	Upper 10%	3.00	3.10	3.20
	Lower 10%	2.10	1.90	2.00
	Median	2.50	2.40	2.60
Panelist 9				
	Upper 10%	3.00	2.90	2.90
	Lower 10%	2.00	1.90	1.60
	Median	2.50	2.50	2.40

All data in the above table are percentage growth rates.

Maricopa Construction Employment Growth Rate				
		2004	2005	2006
Panelist 1				
	Upper 10%	3.00	5.50	7.00
	Lower 10%	-1.00	0.00	1.10
	Median	1.00	2.50	3.70
Panelist 2				
	Upper 10%	1.00	2.00	5.00
	Lower 10%	-3.00	-2.00	0.00
	Median	-1.00	-1.00	1.00
Panelist 3				
	Upper 10%	12.00	15.00	15.00
	Lower 10%	-15.00	-15.00	-10.00
	Median	1.00	2.00	3.00
Panelist 4				
	Upper 10%	2.00	4.00	6.00
	Lower 10%	0.00	1.00	2.00
	Median	1.00	3.00	5.00
Panelist 5				
	Upper 10%	1.20	2.90	3.20
	Lower 10%	-1.20	-1.00	-1.30
	Median	0.00	1.80	2.30
Panelist 6				
	Upper 10%	1.00	1.00	3.00
	Lower 10%	-2.00	-2.00	-2.00
	Median	0.00	0.00	1.00
Panelist 7				
	Upper 10%	6.00	10.00	10.00
	Lower 10%	-1.00	0.00	0.00
	Median	4.00	5.00	5.00
Panelist 8				
	Upper 10%	0.00	1.00	2.50
	Lower 10%	-2.50	-2.00	-1.00
	Median	-2.00	-1.50	0.00
Panelist 9				
	Upper 10%	0.70	4.00	4.00
	Lower 10%	-1.50	-1.20	-1.30
	Median	-0.06	1.50	2.00

All data in the above table are percentage growth rates.

Prime Interest Rate				
		2004	2005	2006
Panelist 1				
	Upper 10%	6.00	7.70	9.10
	Lower 10%	4.20	4.80	6.30
	Median	4.70	5.60	7.70
Panelist 2				
	Upper 10%	5.00	5.50	7.50
	Lower 10%	4.00	4.00	4.00
	Median	4.50	4.50	5.00
Panelist 3				
	Upper 10%	10.00	10.00	10.00
	Lower 10%	4.00	4.00	4.00
	Median	5.00	6.00	7.00
Panelist 4				
	Upper 10%	5.50	6.50	7.50
	Lower 10%	4.50	5.50	6.50
	Median	5.00	6.00	7.00
Panelist 5				
	Upper 10%	5.00	6.00	7.50
	Lower 10%	3.75	3.75	4.00
	Median	4.25	5.00	6.00
Panelist 6				
	Upper 10%	6.00	6.00	6.50
	Lower 10%	4.50	4.50	4.50
	Median	5.00	5.00	5.50
Panelist 7				
	Upper 10%	7.00	7.50	8.50
	Lower 10%	4.00	4.50	5.50
	Median	5.30	5.60	6.50
Panelist 8				
	Upper 10%	5.00	5.50	6.00
	Lower 10%	4.20	4.30	4.40
	Median	4.60	5.00	5.50
Panelist 9				
	Upper 10%	6.00	7.00	8.00
	Lower 10%	4.80	6.00	6.50
	Median	5.40	6.50	7.00

All data in the above table are nominal percentage values.

Phoenix CPI Growth Rate				
		2004	2005	2006
Panelist 1				
	Upper 10%	2.30	3.00	5.10
	Lower 10%	1.40	2.00	2.20
	Median	1.80	2.40	3.10
Panelist 2				
	Upper 10%	3.00	3.50	3.75
	Lower 10%	1.00	1.25	1.50
	Median	1.80	2.00	2.50
Panelist 3				
	Upper 10%	3.00	4.50	6.00
	Lower 10%	1.80	2.10	2.20
	Median	2.00	3.50	4.00
Panelist 4*				
	Upper 10%	2.10	2.30	2.60
	Lower 10%	1.50	1.70	2.00
	Median	1.80	2.00	2.30
Panelist 5				
	Upper 10%	2.10	2.50	4.00
	Lower 10%	1.30	1.40	1.50
	Median	1.70	1.80	2.00
Panelist 6				
	Upper 10%	1.80	2.00	2.20
	Lower 10%	1.20	1.30	1.30
	Median	1.50	1.70	1.80
Panelist 7				
	Upper 10%	3.00	3.50	3.50
	Lower 10%	1.00	1.00	1.00
	Median	1.80	1.90	1.80
Panelist 8				
	Upper 10%	2.40	2.60	3.00
	Lower 10%	1.50	1.60	1.70
	Median	1.90	2.00	2.10
Panelist 9				
	Upper 10%	2.20	2.40	3.00
	Lower 10%	1.40	1.60	2.00
	Median	1.80	2.00	2.40

All data in the above table are percentage growth rates.

HISTORICAL DATA

GROWTH IN REAL INCOME PER CAPITA

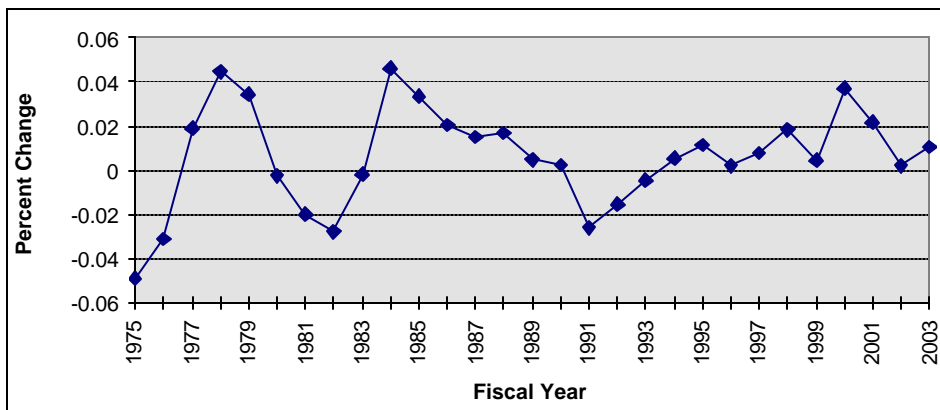
Using Phoenix CPI to Measure Inflation (Annual Percent Change)

HISTORIC DATA BY FISCAL YEAR (July 1 through June 30)

1960	1970	1980	-0.2%	1990	0.2%	2000	3.7%
1961	1971	1981	-2.0%	1991	-2.6%	2001	2.2%
1962	1972	1982	-2.8%	1992	-1.5%	2002	0.2%
1963	1973	1983	-0.2%	1993	-0.5%	2003*	1.1%
1964	1974	1984	4.6%	1994	0.5%	2004	
1965	1975	1985	3.4%	1995	1.1%	2005	
1966	1976	1986	2.0%	1996	0.2%	2006	
1967	1977	1987	1.5%	1997	0.8%	2007	
1968	1978	1988	1.7%	1998	1.8%	2008	
1969	1979	1989	0.5%	1999	0.5%	2009	

*Estimate

HISTORICAL DATA - GRAPHED



HISTORICAL DATA - ANALYSIS

Period	Historical		Mean	Std. Dev.	80% Range	
	Min.	Max.			Lower	Upper
5 Years	1.20%	2.10%	1.65%	0.42%	1.26%	2.10%
10 Years	0.00%	2.10%	1.49%	0.68%	0.88%	2.10%
Full Period	-5.09%	4.43%	0.63%	2.29%	-2.43%	3.19%

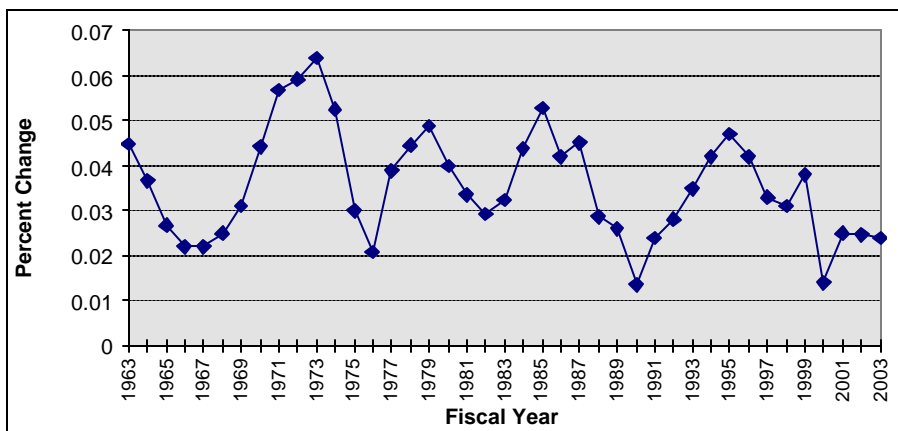
HISTORICAL DATA MARICOPA COUNTY POPULATION GROWTH (Annual Percent Change)

HISTORIC DATA BY FISCAL YEAR (July 1 through June 30)

1960		1970 4.4%	1980 4.0%	1990 1.4%	2000 1.4%
1961		1971 5.7%	1981 3.4%	1991 2.4%	2001 2.5%
1962 4.7%		1972 5.9%	1982 2.9%	1992 2.8%	2002 2.5%
1963 4.5%		1973 6.4%	1983 3.2%	1993 3.5%	2003 2.4%
1964 3.7%		1974 5.2%	1984 4.4%	1994 4.2%	2004
1965 2.7%		1975 3.0%	1985 5.3%	1995 4.7%	2005
1966 2.2%		1976 2.1%	1986 4.2%	1996 4.2%	2006
1967 2.2%		1977 3.9%	1987 4.5%	1997 3.3%	2007
1968 2.5%		1978 4.4%	1988 2.9%	1998 3.1%	2008
1969 3.1%		1979 4.9%	1989 2.6%	1999 3.8%	2009

DES smoothed out the 1991 to 1995 figures. 1996-1999 data from October 2000 approved DES estimates and 2000-2003 from February 1997 approved DES projections.

HISTORICAL DATA - GRAPHED



HISTORICAL DATA - ANALYSIS

Period	Historical		Mean	Std. Dev.	80% Range	
	Min.	Max.			Lower	Upper
5 Years	1.40%	3.80%	2.54%	0.98%	1.72%	3.41%
10 Years	1.40%	4.70%	3.30%	1.05%	2.26%	4.30%
Full Period	1.36%	6.39%	3.57%	1.17%	2.21%	4.92%

HISTORICAL DATA

MARICOPA COUNTY GROWTH IN CONSTRUCTION EMPLOYMENT

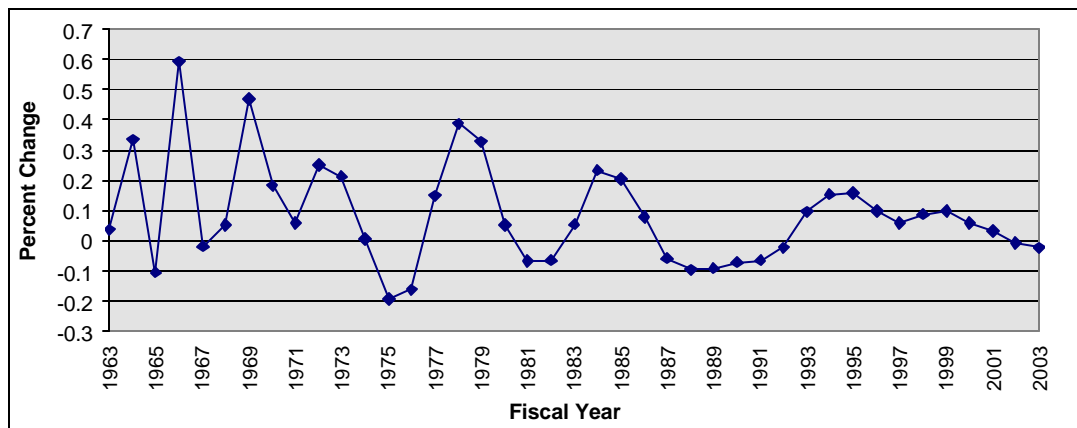
(Annual Percent Change)

HISTORIC DATA BY FISCAL YEAR (July 1 through June 30)

1960		1970	18.2%	1980	5.2%	1990	-7.2%	2000	5.8%
1961		1971	5.9%	1981	-6.7%	1991	-6.5%	2001	3.1%
1962	8.3%	1972	24.9%	1982	-6.5%	1992	-2.4%	2002	-0.9%
1963	3.6%	1973	21.3%	1983	5.4%	1993	9.5%	2003 *	-2.4%
1964	33.3%	1974	0.4%	1984	23.4%	1994	15.4%	2004	
1965	-10.5%	1975	-19.3%	1985	20.3%	1995	15.8%	2005	
1966	59.2%	1976	-16.3%	1986	7.9%	1996	9.7%	2006	
1967	-1.9%	1977	14.7%	1987	-5.8%	1997	5.8%	2007	
1968	5.2%	1978	38.7%	1988	-9.8%	1998	8.7%	2008	
1969	46.9%	1979	32.7%	1989	-9.1%	1999	9.7%	2009	

*Estimate

HISTORICAL DATA - GRAPHED



HISTORICAL DATA - ANALYSIS

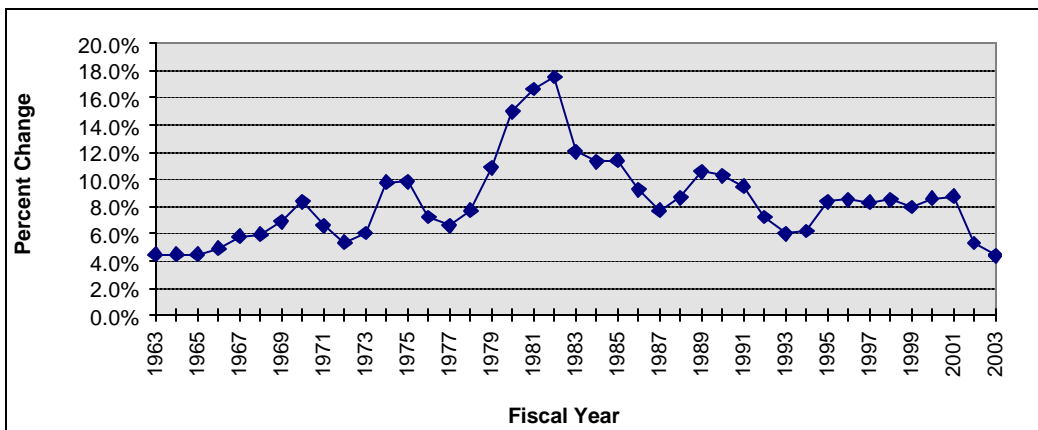
Period	Historical		Mean	Std. Dev.	80% Range	
	Min.	Max.			Lower	Upper
5 Years	-1.10%	9.66%	4.13%	4.76%	-0.25%	8.63%
10 Years	-1.10%	15.79%	7.99%	5.61%	1.16%	15.46%
Full Period	-19.33%	59.23%	8.66%	16.75%	-9.10%	32.72%

HISTORICAL DATA PRIME INTEREST RATE

HISTORIC DATA BY FISCAL YEAR (July 1 through June 30)

1960		1970	8.37%	1980	14.98%	1990	10.30%	2000	8.60%
1961	4.57%	1971	6.62%	1981	16.62%	1991	9.46%	2001	8.74%
1962	4.50%	1972	5.38%	1982	17.53%	1992	7.25%	2002	5.31%
1963	4.50%	1973	6.06%	1983	12.01%	1993	6.00%	2003	4.42%
1964	4.50%	1974	9.79%	1984	11.29%	1994	6.23%	2004	
1965	4.50%	1975	9.82%	1985	11.38%	1995	8.37%	2005	
1966	4.94%	1976	7.22%	1986	9.24%	1996	8.52%	2006	
1967	5.80%	1977	6.59%	1987	7.73%	1997	8.32%	2007	
1968	5.96%	1978	7.71%	1988	8.66%	1998	8.50%	2008	
1969	6.91%	1979	10.85%	1989	10.56%	1999	7.98%	2009	

HISTORICAL DATA - GRAPHED



HISTORICAL DATA - ANALYSIS

Period	Historical		Mean	Std. Dev.	80% Range	
	Min.	Max.			Lower	Upper
5 Years	5.31%	8.74%	7.66%	1.60%	6.11%	8.70%
10 Years	5.31%	8.74%	7.84%	1.21%	6.05%	8.63%
Full Period	4.50%	17.53%	8.29%	3.09%	4.61%	11.37%

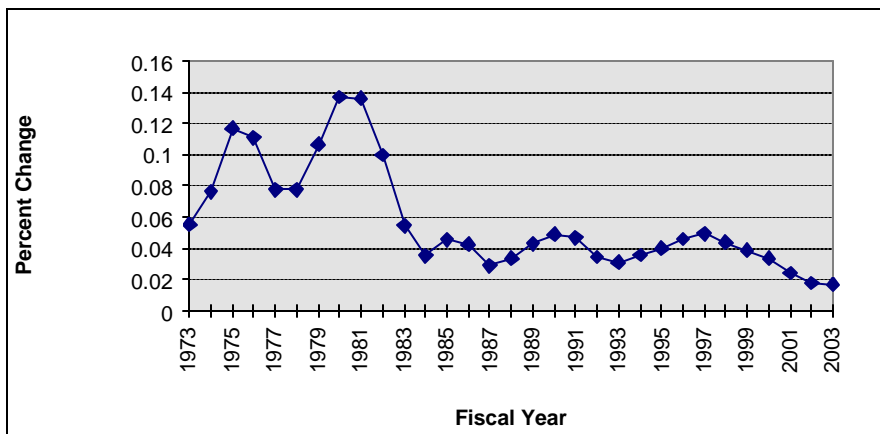
HISTORICAL DATA PHOENIX CPI GROWTH RATE (Annual Percent Change)

HISTORIC DATA BY FISCAL YEAR (July 1 through June 30)

1960	1970	1980	13.7%	1990	4.9%	2000	3.4%
1961	1971	1981	13.6%	1991	4.7%	2001	2.4%
1962	1972	1982	10.0%	1992	3.4%	2002	1.8%
1963	1973	1983	5.5%	1993	3.1%	2003*	1.7%
1964	1974	1984	3.5%	1994	3.6%	2004	
1965	1975	1985	4.6%	1995	4.0%	2005	
1966	1976	1986	4.2%	1996	4.6%	2006	
1967	1977	1987	2.9%	1997	4.9%	2007	
1968	1978	1988	3.4%	1998	4.4%	2008	
1969	1979	1989	4.3%	1999	3.9%	2009	

* Estimate

HISTORICAL DATA - GRAPHED



HISTORICAL DATA - ANALYSIS

Period	Historical		Mean	Std. Dev.	80% Range	
	Min.	Max.			Lower	Upper
5 Years	1.80%	3.85%	2.85%	0.92%	1.98%	3.70%
10 Years	1.80%	4.91%	3.65%	1.02%	2.28%	4.67%
Full Period	1.80%	13.70%	5.90%	3.31%	3.09%	11.10%